

## NASA Ares I Crew Launch Vehicle Upper Stage Overview

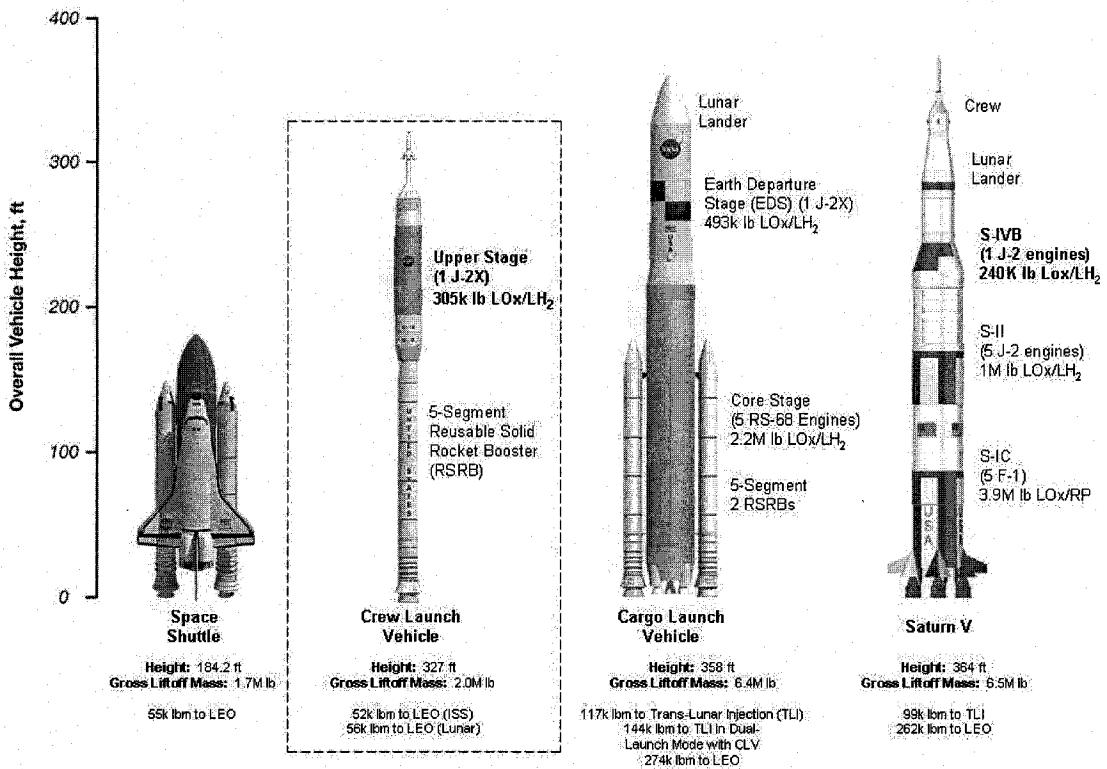
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### Abstract

By incorporating rigorous engineering practices, innovative manufacturing processes and test techniques, a unique multi-center government/contractor partnership, and a clean-sheet design developed around the primary requirements for the International Space Station (ISS) and Lunar missions, the Upper Stage Element of NASA's Crew Launch Vehicle (CLV), the "Ares I," is a vital part of the Constellation Program's transportation system. Constellation's exploration missions will include Ares I and Ares V launch vehicles required to place crew and cargo in low-Earth orbit (LEO), crew and cargo transportation systems required for human space travel, and transportation systems and scientific equipment required for human exploration of the Moon and Mars. Early Ares I configurations will support ISS re-supply missions.

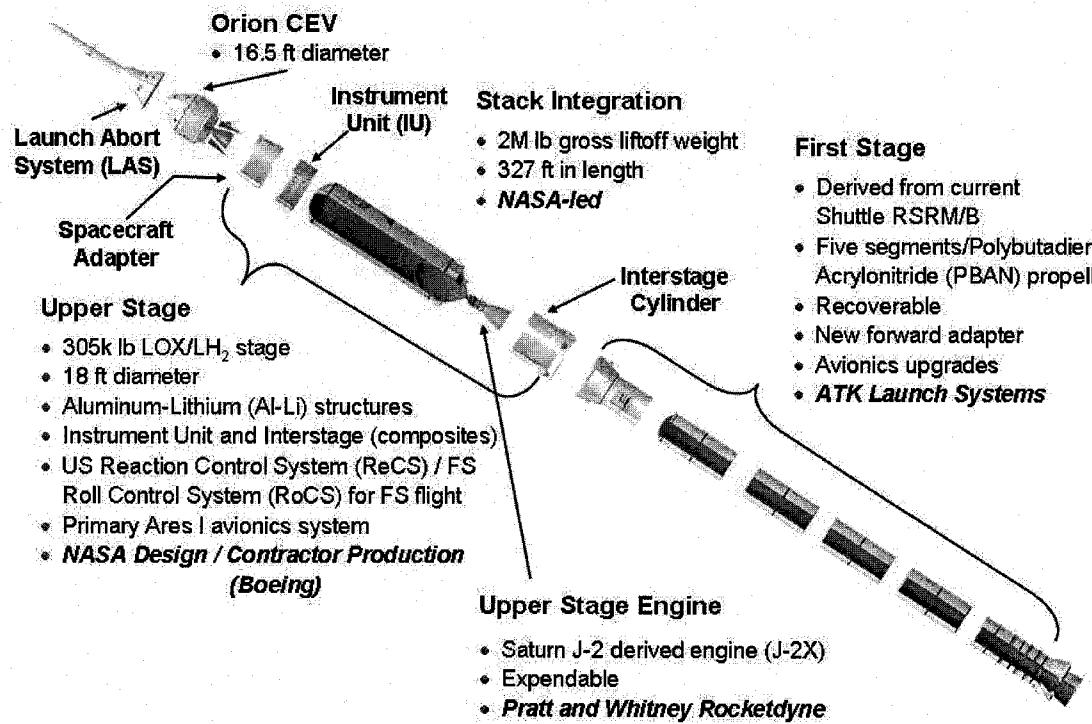
A self-supporting cylindrical structure, the Ares I Upper Stage will be approximately 84' long and 18' in diameter. The Upper Stage Element is being designed for increased supportability and increased reliability to meet human-rating requirements imposed by NASA standards. The design also incorporates state-of-the-art materials, hardware, design, and integrated logistics planning, thus facilitating a supportable, reliable, and operable system.

With NASA retiring the Space Shuttle fleet in 2010, the success of the Ares I Project is essential to America's continued leadership in space. The first Ares I test flight, called Ares 1-X, is scheduled for 2009. Subsequent test flights will continue thereafter, with the first crewed flight of the Crew Exploration Vehicle (CEV), "Orion," planned for no later than 2015. Crew transportation to the ISS will follow within the same decade, and the first Lunar excursion is scheduled for the 2020 timeframe.



**Figure 1. Heritage to Development Comparison**

The Ares I Upper Stage is being designed by a NASA Design Team (NDT) and fabricated by the Upper Stage Production Contractor (USPC), The Boeing Company, at the Michoud Assembly Facility (MAF) in New Orleans, Louisiana. NASA awarded this contract to Boeing in August 2007 in a competitive procurement as part of an agreement that includes the assembly, checkout, and delivery of the completed integrated Upper Stage. NASA has also selected an Upper Stage Instrument Unit Avionics Contractor (IUAC), The Boeing Company, to fabricate, assemble, and checkout the avionics hardware and systems into the Instrument Unit (IU). A competitive procurement was completed in December 2007 with the final selection of the IUAC.



**Figure 2. Upper Stage Overview**